"DESIGN AND DEVELOPMENT OF TASTE MASKED ORAL DISINTEGRATING TABLETS FOR ANTI-VERTIGO DRUG"

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By

Mr Pratit Agrawal

M.Pharm.

GUIDE

Dr Amit Chauhan

M.Pharm., PhD

INSTITUTE OF PHARMACEUTICAL SCIENCE AND RESEARCH

SARDAR PATEL UNIVERSITY, BALAGHAT (M.P.),

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1. INTRODUCTION

1. Introduction

Drug delivery system plays a vital role in mitigating an unwanted response. The patient compliance lies in the ease with which the drug is delivered into the body without affecting its efficacy and without causing any inconvenience to the patient. The Dosage form plays an equally important role in producing an effective treatment. Oral administration is one of the most used ways for drug administration. The drug can be taken in the form of tablets, capsules with optimum amount of water (Gopinath R, 2013).

For the patients who have a problem in swallowing, mainly the children and the old, oral disintegrating tablets is a good choice. These can be taken without water and have a great bioavailability. These can be useful for the patients who are nearly unconscious, uncooperative, suffering from Parkinson's disorder and for the people who don't have access to water when required. The main advantage is that they are very easy to administer and the patient doesn't have a feeling of taking in a tablet rather excited for the method of delivery (disintegrating) (Gopinath R, 2013).

The United States Food and Drug Administration defined these Oral Disintegrating Tablets as "A solid dosage form containing medicinal substance or active ingredient which disintegrates rapidly usually within a matter of seconds when placed upon the tongue. Oral Disintegrating tablets can also be called as Fast melt, quick dissolve, mouth dissolving, or disperse, freeze dried wafers, porous tablets or rapid melt etc. United States Pharmacopoeia (USP) approved these dosage forms as ODT's. In an effort to develop drug products that are more convenient to use and to address potential issues of patient compliance for certain product indications and patient populations, pharmaceutical manufacturers have developed products that can be ingested simply by placing them on the tongue. The products are designed to disintegrate or dissolve rapidly on contact with saliva, thus eliminating the need to chew the tablet, swallow an intact tablet, or take the tablet with liquids. This mode of administration was initially expected to be beneficial to pediatric and geriatric patients, to people with conditions related to impaired swallowing, and for treatment of patients when compliance may be difficult (e.g., for psychiatric disorders) (Gopinath R, 2013).

1.1 Advantages of Oral Disintegrating Tablets (Tiwari N, 2013)

1. Good solubility in water and saliva.
2. Free from bitter taste.
3. Dose lower than 20 mg.
4. Small to lower molecular weight.
5. Partially non-ionized to oral cavity at ph (6.8).
6. Ability to permeate oral mucosal tissues.
7. Ability to diffuse and parttion into the epithelail of upper part of GIT.

1.2 Taste masking of tablets (Patil V, 2014)

Ideal properties for taste masking process

Any taste masking process should exhibit following properties:

1. It should require minimum number of excipients for an optimum formulation.
2. It should have not any adverse effect on drug bioavailability.
3. It should involve least number of equipment's and processing steps.
4. It should be carried out at room temperature.
5. Require excipients that are economical and easily available.
6. Least manufacturing cost.
7. Rapid and easy to prepare.
8. Require excipients that have high margin of safety.

1.3 Taste masking techniques (Patil V, 2014)

- Adsorption
- Prodrug approach
- Bitterness inhibitor
- Multiple emulsion technique
- Gel formation
- Miscellaneous
- Hot melt coating

1.4 To achieve the goal of taste abatement of bitter or unpleasant taste of drug, various techniques is reported. These are as follows (Patil V, 2014):

- Addition of flavoring and sweetening agents
- Microencapsulation
- Ion-exchange
- Inclusion complexation
- Granulation
- Adsorption
- Prodrug approach
- Bitterness inhibitor
- Multiple emulsion technique
- Gel formation
- Hot melt coating

1.5 Techniques For Preparation Of ODT (Yapar E, 2014)

Freeze drying/ Lyophilization

This process is based on solvent removal from a frozen drug solution or suspension which contains structure forming excipients. The process generally resulted as very light and highly porous form in nature.

Spray drying

This process is based upon to use of a particulate support matrix prepared by spray drying. Support matrix and other components containing aqueous composition form a highly porous and fine powder, then disintegration and dissolution improve by adding effervescent components and finally spray dried to yield a porous powder.

Molding

This process is achieved by using water soluble ingredients mostly sugars. Drug and excipients powder blend is pushed through a very fine screen then moistened with a hydroalcoholic solvent and moulded into tablets under pressure, the process ended by evaporating of the solvent by air drying.

Phase transition process

In this process, tablets which contain sugar alcohols having high and low melting points are prepared by compressing; following heating to enhance bonding among particles resulted as sufficient hardness of tablets.

Melt granulation

In this process powders are efficiently agglomerated by the use of binder which can be liquid or melting during the process by using high shear mixers, and temperature is raised above the melting point of the binder.

Sublimation

For accomplishing this process some inert volatile substances like urea, camphor etc. is added to other tablet excipients and blend is compressed into tablet. Subsequently removal of volatile substances by sublimation generates a porous structure.

Mass extrusion

This process based on softening of the active blend by using a solvent mixture of water soluble polyethylene glycol and methanol. Following expulsion of softened mass through the extruder or syringe to get a cylindrical shaped, they cut into segments by using heated blade to form tablets.

Cotton candy process

This process based on formation of matrix of polysaccharides or saccharides which are partially recrystallized and attain better flow properties and compressibility by concurrent action of flash melting and spinning. Then matrix is milled and blended with active ingredients and excipients, soon after compressed to form tablets.

Direct compression

The basic principle of this technique is addition of superdisintegrants in optimum concentrations to tablet formulation in which powdered blend compress directly to form tablets.

2. LITERATURE REVIEW

1. Vandana Patil *et al* (2014) was reviewed that the Taste is a critical factor in development of oral dosage form. Taste masking is important for bitter drugs to improve the patient compliance especially in the pediatric and geriatric populations. Two approaches commonly used to overcome the bitter taste of drug are reduction of drug solubility in the saliva and alteration of the ability of the drug to interact with taste receptors. These techniques not only mask the taste of drug, but also may enhance the bioavailability of dosage form.

2. Evren ALĞIN YAPAR *et al* (2014) was studied the Orally disintegrating tablets (ODTs) which is greatly increased dosage forms which have remarkable impact on the patient compliance especially for the pediatric, geriatric and psychiatric patients with deglutition disorders. Several technologies either conventional or patented based on freeze drying/lyophilization, spray drying, moulding, phase transition process, melt granulation, sublimation, mass extrusion, cotton candy process, direct compression etc. have been developed for manufacturing of ODTs. In this review brief information about ODTs including definition, ideal and desired characteristics, advantages, limitations and disadvantages, drug canditates, challenges in formulation, excipients with recent developments in superdisintegrants, tast masking, manufacturing techniques, evaluation parameters and recent patents in ODTs are presentented.

3. Sona PS *et al* (2011) was studied the diclofenac sodium and to formulate an orally-disintegrating tablet (ODT) of the taste-masked drug. The methods commonly employed for achieving effective taste masking include various physical and chemical methods that prevent the drug substance from interaction with the taste buds. In this study used veegum (magnesium aluminum silicate) as the taste masking agent and sodium starch glycolate and croscarmellose sodium as superdisintegrants. Granules of diclofenac sodium was prepared using different ratios of veegum (1:0.5, 1:1, 1:1.5, 1:2) by wet granulation method and evaluated for pre-compression parameters. With the help of invitro and invivo taste evaluation the optimum ratio (1:1.5) of the drug –veegum was determined. Fast dissolving tablets of diclofenac sodium were prepared using this ratio of drug – veegum and the superdisintegrants (2-5%) and evaluated for post compression

parameters. From this study, it can be concluded that taste masked diclofenac sodium fast disintegrating tablets can be successfully prepared using veegum as a taste masking agent (1:1.5) and the sodium starch glycolate and croscarmellose sodium (5%) as superdisintegrants.

4. Yash Paul *et al* (2011) was studied the formulate and evaluate taste masked dispersible tablets of zidovudine. Dispersible tablets of zidovudine were prepared using crosscarmellose sodium (Ac-di-sol) as disintegrant. Surelease clear (E-7-19010) in concentration range of 0.044mL/tab to 0.052mL/tab completely masked the taste of zidovudine. The prepared tablets were evaluated for general appearance, drug content, weight variation, thickness, hardness, friability, taste evaluation, mouth feel, in vitro dispersion time and in vitro dissolution studies. Tablet formulations showed quick disintegration time, which is very characteristic of dispersible tablets. Results revealed that the tablets containing taste enhancers and surelease as binder had a good palatability. Oral dispersible tablets prepared using Surelease 0.044mL/tablet and Ac-di-sol 6% possessed least disintegration time (18.9), pleasant taste and offered better dissolution profile than that of all other dispersible tablet formulations developed in the present nvestigation and that of marketed conventional tablet formulation of zidovudine.

5. Sunil Makwana *et al* (2011) was studied the formulate a orodispersible of the taste-masked drug. Taste masking was done by complexing ondansetron HCl with indion 204 in different ratios by the solvent evaporation. Drug- resin complex were optimized by considering parameters such as optimization of resin concentration, optimization of swelling time, optimization of stirring time, optimization of pH and optimization of temperature on maximum drug loading. The effects of variables were observed on maximum amount of the drug loading. During preparation of drug resin complex (resinate), the other variables were kept constant. The resinate was evaluated for taste masking, characterized by X-Ray diffraction and infra red spectrometer. In vitro drug release study of taste masked tablet showed that more than 90 % of the drug release within 20 minutes. Thus, results conclusively demonstrated successful masking of taste and rapid disintegration of the formulated tablets in the oral cavity.

3. AIM AND OBJECTIVE

3.1 Aim

To Design and develop Taste Masked Oral Disintegrating Tablets for Anti-Vertigo Drug.

3.2 Objective

1. To provide prolonged and constant therapeutic effect.
2. To reduce the dosing frequency and therefore improve the patient compliance
3. To Decrease in toxicity while maintaining therapeutic effects.
4. To provide controlled, sustained and targeted delivery of the drug.
5. Development of safe medicine.

4. PLAN OF WORK

4.1. Literature survey

4.2. Procurement of Drugs and Excipients

4.3. Preformulation study

- Physical Characteristics
- Melting Point
- Solubility studies

4.4. Formulation of Taste Masked Tablet.

4.6. Evaluation of Tablet

a) Weight variation

b) Friability

c) Hardness

d) Wetting time

e) Water absorption ratio

f) *In vitro*-Disintegration

g) *In vitro*-Dissolution

4.7 Results and Discussion

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(Mr Pratit Agrawal)
M.Pharm.
Research Scholar

(Dr Amit Chauhan)
M.Pharm., PhD
Research Guide